REMARKS

The present application includes claims 1-22. The Applicants respectfully submit that pending claims 1-22 define patentable subject matter.

Claims 1-6, and 11-16 remain rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,622,174 ("Yamazaki"). Claims 8-10, and 18-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki in view of United States Patent No. 6,017,309 ("Washburn"). The Applicants respectfully traverse these rejections at least for the reasons set forth previously during prosecution and the following:

I. Claims 1-6 And 11-16 Are Not Anticipated By Yamazaki

The Applicants first turn to the rejection of claims 1-6, and 11-16 as being anticipated by Yamazaki. The Office Action responds to the Applicants' previous Amendment as follows:

> The applicant's arguments focus on the "processor" paragraph in independent claim 1 and same material in independent claim 11. The applicant argues that Yamazaki does not disclose the material in this paragraph.
>
> The paragraph can be broken up into three requirements.
> a. A processor responsive to said received signals to generate a set of parameter signals representing values of said movement parameter within said structure during said time period (As previously shown Yamazaki discloses a processor which receives the ultrasound signal and computes velocity information, i.e., parameter signals.)
>
> b. A processor responsive to a distribution of said set of parameter signals (This portion is given little weight as long as the processor responds to the parameter signals, which it must to convert these signals into color.)

> c. A mapping algorithm to generate a set of color characteristic signals representative of said values of said movement parameter (In order for Yamazaki to convert the velocity information into a color image there must be some kind of function or algorithm to perform this conversion. This is the mapping algorithm.)
>
> As shown Yamazaki discloses all of items claimed in the processor paragraph. The same content was claimed in independent claim 11 and is rejected for the same reasons as given above for claim 1.

See November 4, 2005 Office Action at pages 3-4.

Claim 1 of the present application, however, recites, in part, the following:

> a **processor** responsive to said received signals to generate a set of parameter signals representing values of said movement parameter within said structure during said time period and **responsive to** a distribution of said set of parameter signals and **a mapping algorithm to generate a set of color characteristic signals representative of said values of said movement parameter**...

The processor is "responsive to... a distribution of said set of parameter signals **and** a mapping algorithm to generate a set of color characteristic signals representative of said values of said movement parameter." That is, through the distribution of the set or parameter signals and the mapping algorithm, the processor generates a set of color characteristic signals representative of said values of said movement parameter. This is an adaptive system and method in which the set of color characteristics change based upon the distribution of the set of parameter signals and the mapping algorithm. However, the color characteristic signals are not pre-assigned a fixed color designation, such as in Yamazaki.

The Applicants respectfully maintain that Yamazaki does not disclose each and every limitation of the pending claims. In particular, Yamazaki does not teach or suggest

a "processor responsive to... a distribution of said set of parameter signals and a mapping algorithm **to generate a set of color characteristic signals** representative of said values of said movement parameter," as recited in claim 1, nor "generating a set of color characteristic signals representative of said values of said movement parameter **in response to a distribution of said set of parameter signals and a mapping algorithm**," as recited in claim 11

Yamazaki discloses an "ultrasonic diagnosis apparatus" that includes "an element for calculating movement velocities every sampling volume on the basis of the ultrasonic echo signals," and an "element for displaying in color the movement velocities." *See* Yamazaki at Abstract. Yamazaki, however, describes a **fixed, non-adaptive** system and method displaying movement velocities in color. Yamazaki's system and method is fixed in that contraction is always assigned a first color (red), while expansion is always assigned a second color (blue).

Yamazaki discloses an embodiment in which velocity changes are shown through **variable shading** of **one or two** colors:

> For the category (i), there are two ways: (i-a) one way uses the same color, but brightness changes according to the magnitude of velocity, (i-b) the other way uses changed colors according to the magnitude.
>
> For the category (ii) of display, the direction is displayed by changed colors and the magnitude by changed brightness. With respect to display of the direction, **applicable display ways are restricted according to conditions of velocities calculated. The color processing circuit 24b of this embodiment will determine color as shown in FIG. 7.** That is, while the contraction of a cardiac muscle is colored as red and the expansion as blue, increased velocities are assigned to brighter red or blue (i.e. increased brightness). In conventionally used color Doppler image, a blood flow going toward the ultrasonic

> beams is displayed as red and a blood flow going away from the beams as blue.

Id. at column 11, lines 17-32 (emphasis added).

Notably, Yamazaki discloses a system and method in which movement of the cardiac muscle is shown **only in red or blue**, with increased velocities "assigned to brighter red or blue." Further, "contraction of a cardiac muscle is colored as red and the expansion as blue." *See also id.* at column 27, lines 23-27 ("This embodiment is such that the curves in systole periods represent changes in area of red or red-related color within the ROI; those in diastole periods represent changes in area of blue or blue-related color within the ROI."). Thus, in Yamazaki, contraction of a cardiac muscle is colored as red, while expansion is in blue. However, Yamazaki does not teach or suggest that contraction may be in blue, while expansion may be in red. In short, Yamazaki discloses a fixed, non-adaptive system and method in which the color for contraction is fixed, while the color for expansion is fixed. Overall, Yamazaki discloses a system and method in which velocity calculations are **assigned** colors before the velocities are even detected, but are not used to determine color representations for those velocities. That is, Yamazaki does not teach or suggest velocity calculation used to determine color representations for the velocities.

Yamazaki clearly articulates this notion of **fixedly assigning red or blue** to particular velocities at column 37, lines 9-12:

> In the color processing circuit 24b, for example, red or re-related color is given to positive contraction velocity (contraction) and blue or blue-related color to negative contraction velocity (expansion), and brightness is changed according to its magnitude.

Yamazaki assigns only red to a particular type of velocity (e.g., positive contraction velocity), and only blue to another velocity (e.g., negative contraction velocity), and merely varies brightness of those two colors to denote increased velocities. The color scheme is fixed in that contraction is colored as red and expansion as blue, with increased velocities denoted by varying brightness. *See id., e.g.,* at column 11, lines 59-64 ("The cross-sectional image consists of a B-mode tomographic image (black-white gradation) of a heart and a color velocity image (2-D) of the cardiac muscle of the heart colored, **which is determined according to a color table shown in FIG. 7**...."), *and* column 29, lines 51-56 ("The stored data in the unit 150 will then be sent to the DSC 156 having a DSC circuit 151 for converting scan systems and a color processing circuit 152 having a **lookup table to color velocity data**. As a result, the converted and colored velocity data are outputted from the DSC 156 to the image data synthesizer."). As shown in Figure 7 of Yamazaki, the color table clearly shows that contraction is always assigned red, while expansion is always assigned blue. There are no other possibilities. Nor does Yamazaki generate the color characteristic signals based on the detected velocities. Instead, as shown in Figure 7, the colors are pre-assigned based on contraction or expansion.

Yamazaki does not teach or suggest "a processor responsive to... a distribution of said set of parameter signals and a mapping algorithm to generate a set of color characteristic signals representative of said values of said movement parameter," as recited in claim 1, nor "generating a set of color characteristic signals representative of said values of said movement parameter in response to a distribution of said set of parameter signals and a mapping algorithm," as recited in claim 11. Instead, Yamazaki

assigns fixed colors, either red or blue, which correspond to positive and negative contraction velocities. Because Yamazaki **assigns** colors, which are fixed with respect to contraction (red) and expansion (blue) it does not teach or suggest a processor responsive to a mapping algorithm to **generate a set of color characteristic signals**. Thus, at least for these reasons, claims 1-20 should be in condition for allowance.

II. Claims 8-10 And 18-20 Are Not Rendered Unpatentable By Yamazaki And Washburn

The Applicants next turn to the rejection of claims 8-10, and 18-20 as being unpatentable over Yamazaki in view of Washburn. The Applicants note that the background section of the present application discusses the drawbacks of Washburn. At least for the reasons discussed above, the Applicants respectfully submit that the combination of Yamazaki and Washburn does not render claims 8-10, and 18-20 unpatentable.

III. The Proposed Combination Of Yamazaki And Washburn Does Not Teach Or Suggest A Full Dynamic Range Of A Color Map

The Applicants also respectfully submit that claims 21 and 22 are not rendered unpatentable by Yamazaki alone or in combination with Washburn at least for the reasons discussed above. Additionally, the Applicants note that Yamazaki does not teach, nor suggest, a "color representation of said moving structure in response to said set of color characteristic signals" that "uses a **full dynamic range** of a color map." A full dynamic range of a color map is the panoply of continuous colors over the spectrum represented by R-O-Y-G-B-I-V (Red-Orange-Yellow-Green-Blue-Indigo-Violet).

As noted above, Yamazaki only discloses representing contraction velocities as red or blue, which is not a "full dynamic range of a color map." Yamazaki does disclose displaying additional colors. For example, Yamazaki states the following:

> Hence, the velocity data processing unit 226 not only colors the calculated characteristic component such as mean velocity, but calculates a variation of the movement velocity vector for every section, colors it differently (e.g., with yellow or green) and displays these image data at the display unit 19 (cf. FIG. 94). Consequently, a radial section with a greater variation, for example is displayed with a mean velocity using red or blue having a color tone greater than that of yellow or green.

Id. at column 43, lines 11-19. Thus, mean velocity is displayed as either red or blue, while "variation of the movement velocity vector for every section," may be colored differently. In other words, Yamazaki discloses coloring a first characteristic (e.g., mean velocity) either red or blue, and a second color characteristic either yellow or green. Yamazaki, however, does not teach, nor suggest, a "color representation of said moving structure in response to said set of color characteristic signals" that "uses a full dynamic range of a color map" (such as the panoply of continuous colors over the R-O-Y-G-B-I-V spectrum). Instead, Yamazaki uses a first color set, e.g., red or blue, for a first characteristic, and a second color set, e.g., yellow or green, for a second characteristic. At least for this reason, the Applicants respectfully submit that claims 21 and 22 should be in condition for allowance.

IV. Conclusion

In light of the above, the Applicants request reconsideration of the rejection of the pending claims and look forward to working with the Examiner to resolve any remaining issues in the application. If the Examiner has any questions or the Applicants can be of

any assistance, the Examiner is invited to contact the Applicants. The Commissioner is authorized to charge the additional claims fee (2 new dependent claims X $50/each claim over 20) and any other necessary fees or credit any overpayment to Deposit Account 07-0845.

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